

Message Text

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ACTION OES-09

INFO OCT-01 EA-12 ISO-00 COME-00 EB-08 NSF-02 DODE-00
SS-15 CIAE-00 INR-10 NSAE-00 /057 W
-----070781 220240Z /23
R 220204Z AUG 78
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TO SECSTATE WASHDC 0553

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FOR OES/APT/SA; INR/DDC/OIL

DEPT PASS TO DOC/NBS, MR. LINDAMOOD; NSF; UNDER SECRETARY
OF DEFENSE FOR R&D

E.O. 11652: N/A
TAGS: TPHY, JA
SUBJECT: LABORATORIES OF VLSI TECHNOLOGY RESEARCH
ASSOCIATION

1. VISIT OF JAY HARRIS OF NSF TO JAPAN ENABLED HARRIS
AND EMBASSY SCIENCE OFFICERS TO MAKE VISIT TO COOPERATIVE
LABORATORIES OF VLSI TECHNOLOGY RESEARCH ASSOCIATION ON
AUG. 18. HOSTS WERE MASATO NEBASHI, EXECUTIVE DIRECTOR
OF ASSOCIATION, AND DR. YASUO TARUI, DIRECTOR OF
LABORATORIES.

2. LABORATORIES ARE LOCATED IN FACILITIES RENTED FROM
NIPPON ELECTRIC COMPANY AT LATTER'S CENTRAL RESEARCH
LABORATORY IN KAWASAKI CITY. THEY HAVE BEEN IN OPERATION
FOR ABOUT 1.5 YEARS, FOLLOWING NINE MONTH PERIOD OF
EQUIPMENT PROCUREMENT AND INSTALLATION. STAFF CONSISTS
OF APPROXIMATELY 100, INCLUDING 20 PHD'S. VLSI OFFICIALS
INSISTED ON REPEATED QUESTIONING THAT LABORATORIES ARE TO
FUNCTION ONLY FOR FOUR-YEAR LIFE OF ASSOCIATION AND WILL
THEN BE CLOSED DOWN, WITH PERSONNEL BORROWED FROM GOV'T
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AND PRIVATE ORGANIZATIONS RETURNING TO THEIR PARENT GROUPS
AT THAT TIME.

3. VLSI ASSOCIATION RESEARCH IS CARRIED OUT BY THREE
GROUPS: (A) THE COOPERATIVE LABORATORIES VISITED; (B)
COMPUTER DEVELOPMENT LABORATORIES INC. (JOINT EFFORT OF
FUJITSU, HITACHI, AND MITSUBISHI); AND (C) NEC-TOSHIBA

INFORMATION SYSTEMS INC. TOTAL BUDGET OVER FOUR-YEAR PERIOD IS YEN 70 BILLION, OF WHICH MITI CONTRIBUTES ABOUT ONE-HALF. NEBASHI POINTED OUT THAT OTHER COMPANIES INVOLVED IN VLSI AND COMPUTER R&D SUCH AS OKI AND MATSUSHITA ARE NOT OBLIGATED TO SHARE THEIR RESEARCH RESULTS WITH ASSOCIATION, BUT ASSOCIATION WILL OFFER TO LICENSE PATENTS IT DEVELOPS TO NON-PARTICIPATING COMPANIES. SHARING OF UNPATENTED KNOW-HOW DOES NOT SEEM TO BE REQUIRED. POLICY OF ASSOCIATION IS TO PUBLISH "ACADEMIC" R&D RESULTS IN INTERNATIONAL TECHNICAL LITERATURE AND AT CONFERENCES. RELATIVELY SHORT PERIOD OF OPERATION OF ASSOCIATION LABORATORIES HAS NOT YET PRODUCED MUCH PUBLISHED INFORMATION, BUT THIS WILL INCREASE MARKEDLY IN FUTURE, ACCORDING TO ASSOCIATION OFFICIALS.

4. VLSI ASSOCIATION IS ENGAGED IN SIX MAJOR R&D AREAS: (A) MICROFABRICATION TECHNOLOGY; (B) CRYSTAL TECHNOLOGY; (C) DESIGN TECHNOLOGY; (D) PROCESS TECHNOLOGY; (E) TEST AND EVALUATION TECHNOLOGY; AND (F) DEVICE TECHNOLOGY. COOPERATIVE LABS ARE ENGAGED PRIMARILY IN FUNDAMENTAL WORK (ITEMS (A) AND (B) ABOVE, PLUS PARTS OF (D), (E), AND (F)). TWO INDUSTRY RESEARCH GROUPS ARE RESPONSIBLE FOR APPLICATIONS TECHNOLOGY R&D. CLOSE COOPERATION IS MAINTAINED WITH ELECTROTECHNICAL LABORATORY OF AIST/MITI AND NIPPON TELEPHONE AND TELEGRAPH PUBLIC CORPORATION. UNCLASSIFIED

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5. AMERICANS WERE GIVEN TOUR OF PARTS OF LABORATORY FACILITIES. MANY QUESTIONS WERE ASKED ABOUT SOPHISTICATED EQUIPMENT SEEN AND ANSWERS APPEARED TO BE GIVEN FREELY. R&D APPEARS TO BE HEAVILY CONCENTRATED ON MOS TECHNOLOGY USING ELECTRON BEAMS FOR LITHOGRAPHY. SEVERAL FINE ELECTRON BEAM MACHINES WERE SEEN IN OPERATION, INCLUDING A CAMBRIDGE (UK) DEVICE. MAINSTAY MACHINES, HOWEVER, WERE JAPANESE (JEOL). UNDER DEVELOPMENT AT AN ADVANCED STAGE IS A COMPUTER-CONTROLLED RASTER SCAN E-BEAM MACHINE THAT CAN DRAW AN ENTIRE IC IN TWO SECONDS, CAN PRODUCE DIAGONAL AS WELL AS RECTILINEAR LINES (BY USE OF STAIR-STEP FUNCTION), AND CAN BE PROGRAMMED TO DRAW MORE THAN ONE KIND OF IC ON A SINGLE SILICON CHIP. TOTAL SCAN TIME FOR 50 MM SQUARE CHIP IS ABOUT ONE HOUR. LINE WIDTH WAS SAID TO BE ABOUT 0.25 MICRON, WITH SPACING OF ABOUT 0.5 MICRON. MACHINE IS INSTALLED IN SPECIAL ENCLOSURE FOR TEMPERATURE CONTROL AND SHIELDING. SILICON WAFERS CAN BE FED INTO MACHINE REMOTELY FROM DEVICE HOLDING TEN WAFERS. TOSHIBA HAS BEEN GIVEN JOB OF CONVERTING TECHNOLOGY EVOLVED BY THIS DEVICE INTO PRODUCTION MACHINE. WHEN ASKED, TARUI SAID THAT HIS LAB IS NOT HEAVILY

ENGAGED IN X-RAY OR ION BEAM LITHOGRAPHY OR IN WORK WITH SUBSTRATES OTHER THAN SILICON, ALTHOUGH THESE OPTIONS ARE BEING KEPT OPEN.

6. COMMENT: VLSI LABORATORIES HAVE BEEN RELUCTANT TO RECEIVE FOREIGN VISITORS. WE KNOW THAT BRITISH SCICOUNS IN TOKYO HAS BEEN THERE. TO OUR KNOWLEDGE, NO AMERICAN HAS VISITED LABS UNDER EMBASSY AUSPICES HERETOFORE. NSF SPONSORSHIP OF MICROFABRICATION PROJECT AT CORNELL UNIVERSITY, UNDER DIRECTION OF JAY HARRIS, PROVIDED

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IMPETUS FOR ACCEPTANCE OF VISIT REPORTED HERE. HARRIS DESCRIBED CORNELL PROJECT IN SOME DEPTH DURING COURSE OF VISIT. SCICOUNS HAD TRIED REPORTEDLY TO OBTAIN INVITATION FROM NEBASHI; INVITATION CAME WHEN NSF TOKYO MADE ARRANGEMENTS FOR HARRIS. NSF/T OFFICER ACCOMPANIED HARRIS AND SCICOUNS. THIS REPORT PREPARED BY SCICOUNS AND NOT CLEARED BY HARRIS. SUGGEST THAT ADDRESSEES CONTACT HARRIS FOR FURTHER INFO; HE IS EXPERT ON MICROFABRICATION TECHNOLOGY. END COMMENT. MANSFIELD

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